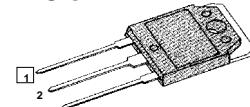


**FEATURES**

- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ Lower Leakage Current: 10 $\mu$ A (Max.) @ V<sub>DS</sub> = 500V
- ◆ Lower R<sub>DS(ON)</sub>: 0.197 $\Omega$  (Typ.)

BV<sub>DSS</sub> = 500 V  
R<sub>DS(on)</sub> = 0.25 $\Omega$   
I<sub>D</sub> = 22 A

TO-3P



1.Gate 2. Drain 3. Source

**Absolute Maximum Ratings**

Symbol	Characteristic	Value	Units
V <sub>DSS</sub>	Drain-to-Source Voltage	500	V
I <sub>D</sub>	Continuous Drain Current (T <sub>C</sub> =25°C)	22	A
	Continuous Drain Current (T <sub>C</sub> =100°C)	13.4	
I <sub>DM</sub>	Drain Current-Pulsed (1)	88	A
V <sub>GS</sub>	Gate-to-Source Voltage	$\pm$ 30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (2)	2151	mJ
I <sub>AR</sub>	Avalanche Current (1)	22	A
E <sub>AR</sub>	Repetitive Avalanche Energy (1)	27.8	mJ
dv/dt	Peak Diode Recovery dv/dt (3)	3.5	V/ns
P <sub>D</sub>	Total Power Dissipation (T <sub>C</sub> =25°C)	278	W
	Linear Derating Factor	2.22	W/ $^{\circ}$ C
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	- 55 to +150	$^{\circ}$ C
T <sub>L</sub>	Maximum Lead Temp. for Soldering Purposes, 1/8. from case for 5-seconds	300	

**Thermal Resistance**

Symbol	Characteristic	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case	--	0.45	$^{\circ}$ C/W
R <sub>θCS</sub>	Case-to-Sink	0.24	--	
R <sub>θJA</sub>	Junction-to-Ambient	--	40	

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	500	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.69	--	$\text{V}/^\circ\text{C}$	$\text{I}_D=250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	--	4.0	V	$\text{V}_{\text{DS}}=5\text{V}, \text{I}_D=250\mu\text{A}$
$\text{I}_{\text{GSS}}$	Gate-Source Leakage , Forward	--	--	100	nA	$\text{V}_{\text{GS}}=30\text{V}$
	Gate-Source Leakage , Reverse	--	--	-100		$\text{V}_{\text{GS}}=-30\text{V}$
$\text{I}_{\text{DSS}}$	Drain-to-Source Leakage Current	--	--	10	$\mu\text{A}$	$\text{V}_{\text{DS}}=500\text{V}$
		--	--	100		$\text{V}_{\text{DS}}=400\text{V}, \text{T}_C=125^\circ\text{C}$
$\text{R}_{\text{DS}(\text{on})}$	Static Drain-Source On-State Resistance	--	--	0.25	$\Omega$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=11\text{A}$ (4)
$\text{g}_{\text{fs}}$	Forward Transconductance	--	17.31	--	$\text{S}$	$\text{V}_{\text{DS}}=50\text{V}, \text{I}_D=11\text{A}$ (4)
$\text{C}_{\text{iss}}$	Input Capacitance	--	3940	5120	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=25\text{V}, f=1\text{MHz}$ See Fig 5
$\text{C}_{\text{oss}}$	Output Capacitance	--	465	535		
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance	--	215	250		
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	--	27	65	ns	$\text{V}_{\text{DD}}=250\text{V}, \text{I}_D=22\text{A}, \text{R}_G=5.3\Omega$ See Fig 13 (4) (5)
$t_r$	Rise Time	--	30	70		
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	--	150	310		
$t_f$	Fall Time	--	43	95		
$\text{Q}_g$	Total Gate Charge	--	182	236	nC	$\text{V}_{\text{DS}}=400\text{V}, \text{V}_{\text{GS}}=10\text{V}, \text{I}_D=22\text{A}$
$\text{Q}_{\text{gs}}$	Gate-Source Charge	--	26	--		See Fig 6 & Fig 12 (4) (5)
$\text{Q}_{\text{gd}}$	Gate-Drain (. Miller. ) Charge	--	79.6	--		

**Source-Drain Diode Ratings and Characteristics**

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{I}_S$	Continuous Source Current	--	--	22	A	Integral reverse pn-diode in the MOSFET
$\text{I}_{\text{SM}}$	Pulsed-Source Current (1)	--	--	88		
$\text{V}_{\text{SD}}$	Diode Forward Voltage (4)	--	--	1.4	V	$\text{T}_J=25^\circ\text{C}, \text{I}_S=22\text{A}, \text{V}_{\text{GS}}=0\text{V}$
$t_{\text{rr}}$	Reverse Recovery Time	--	528	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=22\text{A}$
$\text{Q}_{\text{rr}}$	Reverse Recovery Charge	--	8.35	--	$\mu\text{C}$	$d\text{I}_F/dt=100\text{A}/\mu\text{s}$ (4)

**Notes:**

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2)  $L=8\text{mH}$ ,  $\text{I}_{\text{AS}}=22\text{A}$ ,  $\text{V}_{\text{DD}}=50\text{V}$ ,  $\text{R}_G=27\Omega$ , Starting  $\text{T}_J=25^\circ\text{C}$
- (3)  $\text{I}_{\text{SD}} \leq 22\text{A}$ ,  $d\text{I}/dt \leq 300\text{A}/\mu\text{s}$ ,  $\text{V}_{\text{DD}} \leq \text{BV}_{\text{DSS}}$ , Starting  $\text{T}_J=25^\circ\text{C}$
- (4) Pulse Test: Pulse Width =  $250\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- (5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

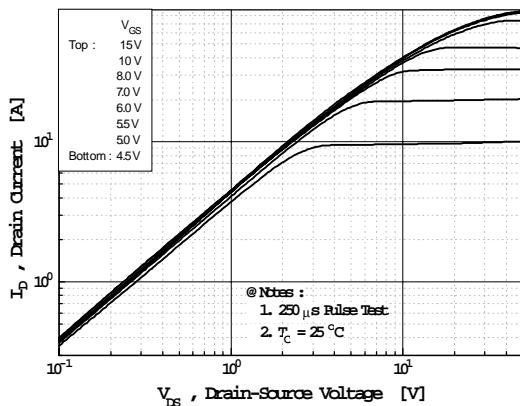


Fig 2. Transfer Characteristics

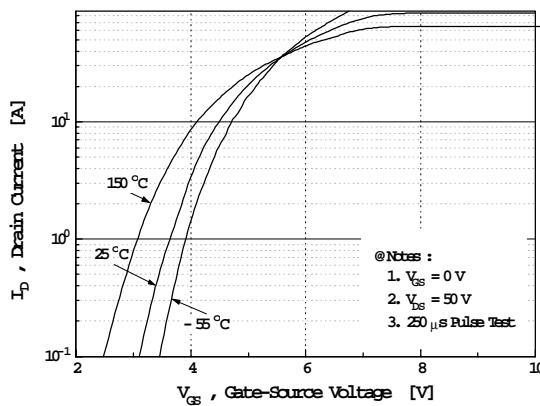


Fig 3. On-Resistance vs. Drain Current

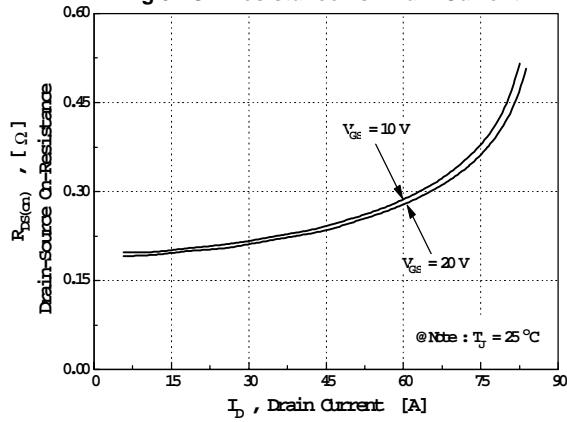


Fig 4. Source-Drain Diode Forward Voltage

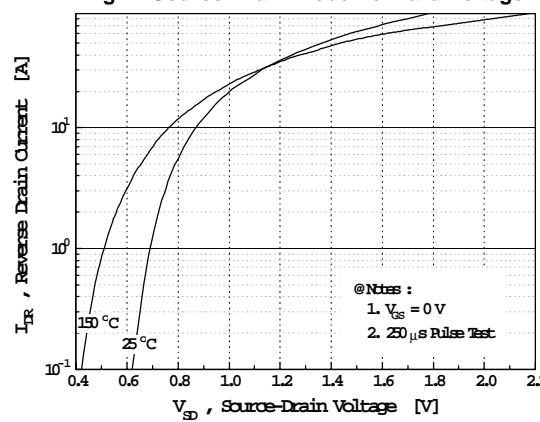


Fig 5. Capacitance vs. Drain-Source Voltage

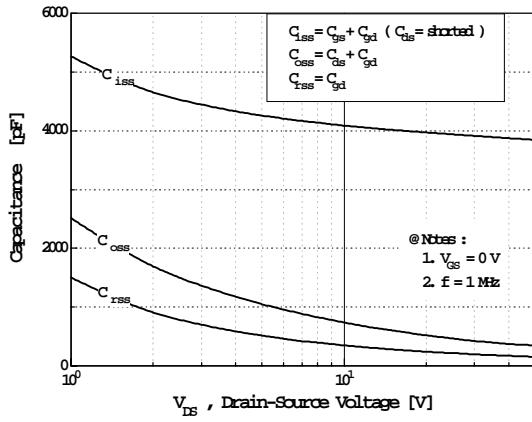
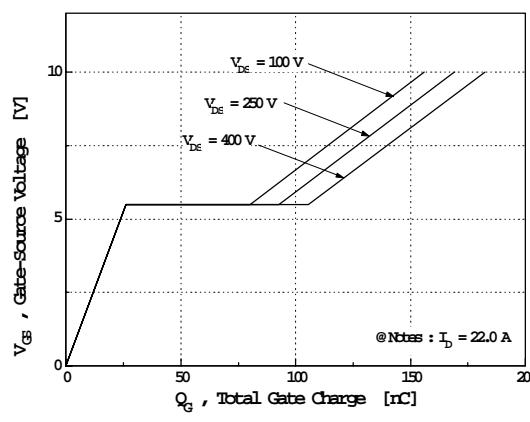
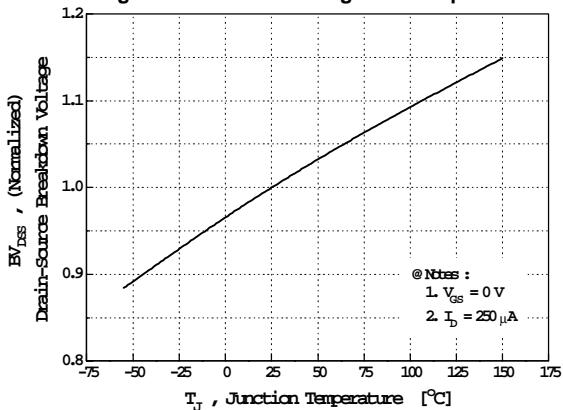


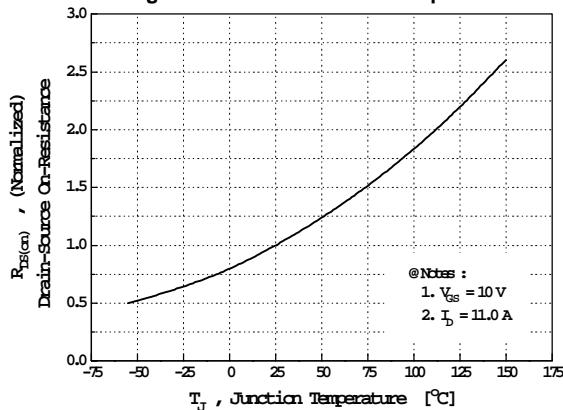
Fig 6. Gate Charge vs. Gate-Source Voltage



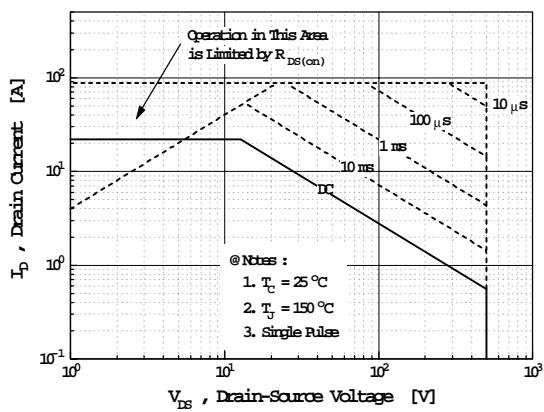
**Fig 7. Breakdown Voltage vs. Temperature**



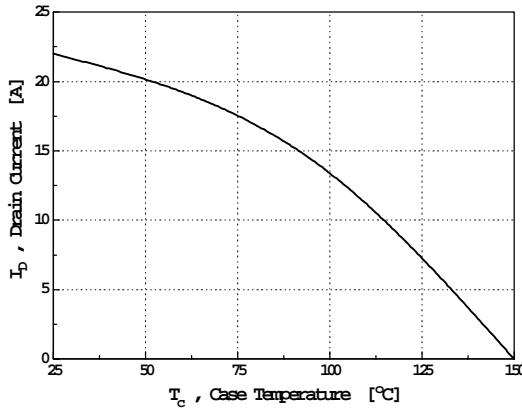
**Fig 8. On-Resistance vs. Temperature**



**Fig 9. Max. Safe Operating Area**



**Fig 10. Max. Drain Current vs. Case Temperature**



**Fig 11. Thermal Response**

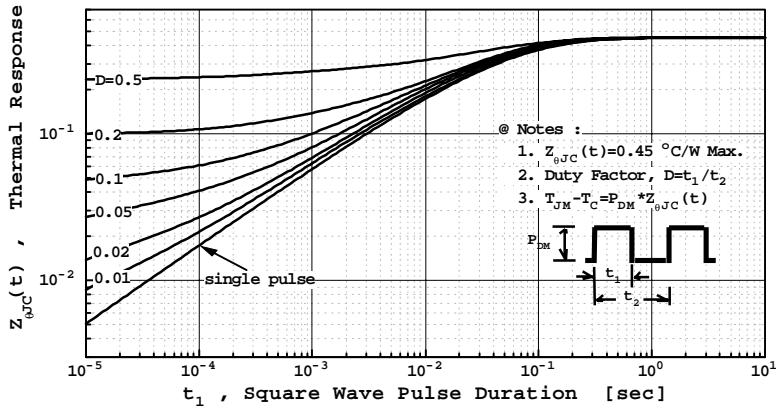


Fig 12. Gate Charge Test Circuit & Waveform

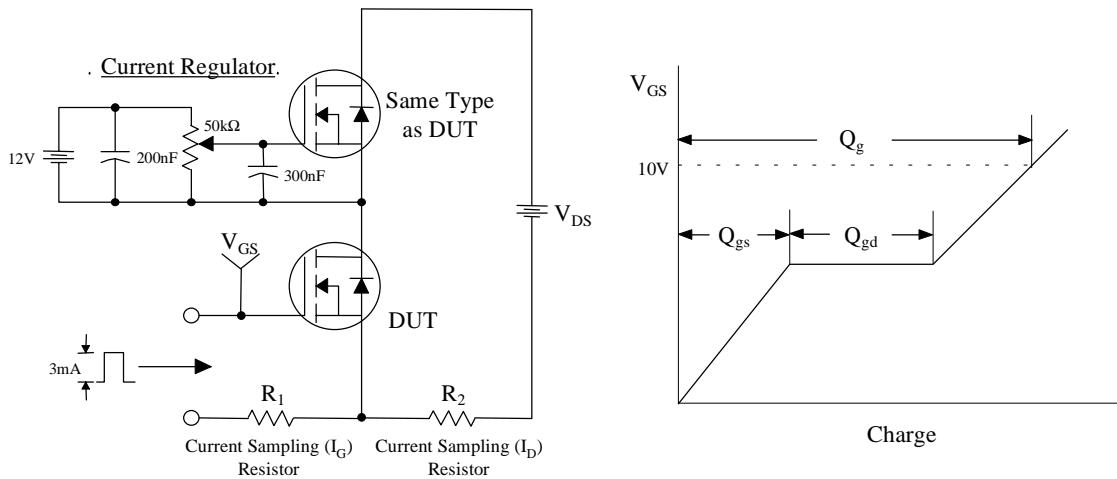


Fig 13. Resistive Switching Test Circuit & Waveforms

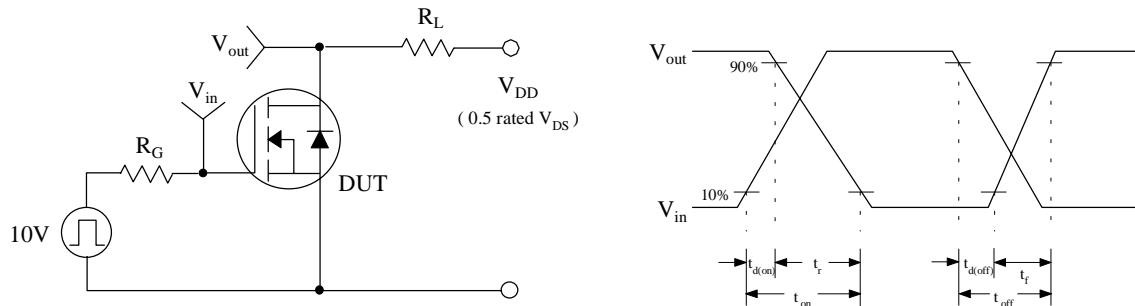


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

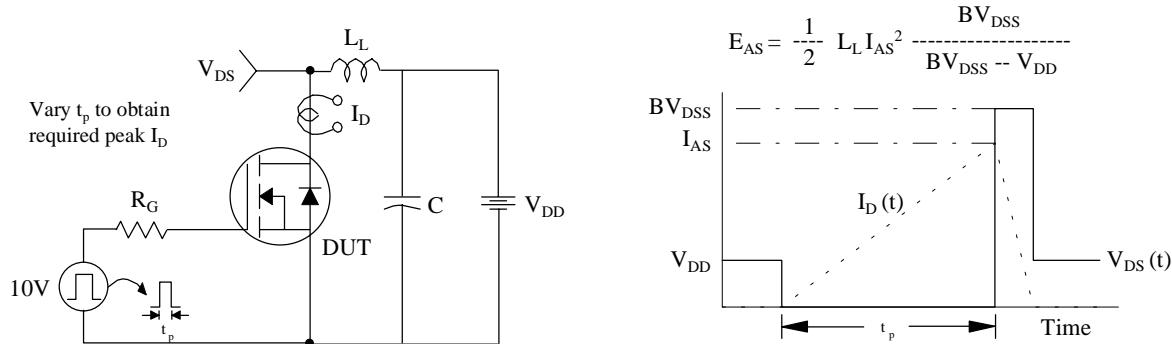
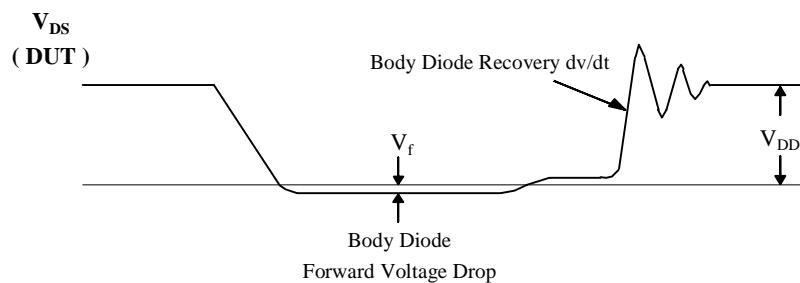
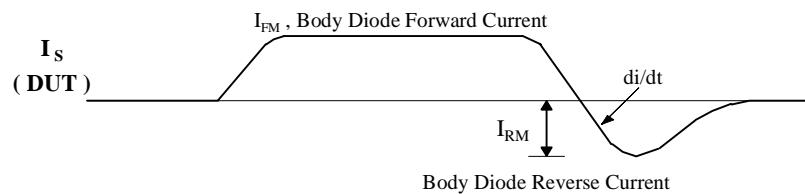
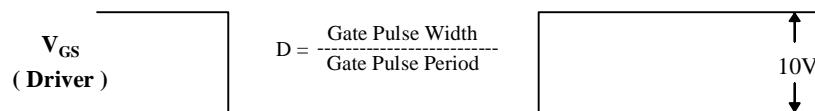
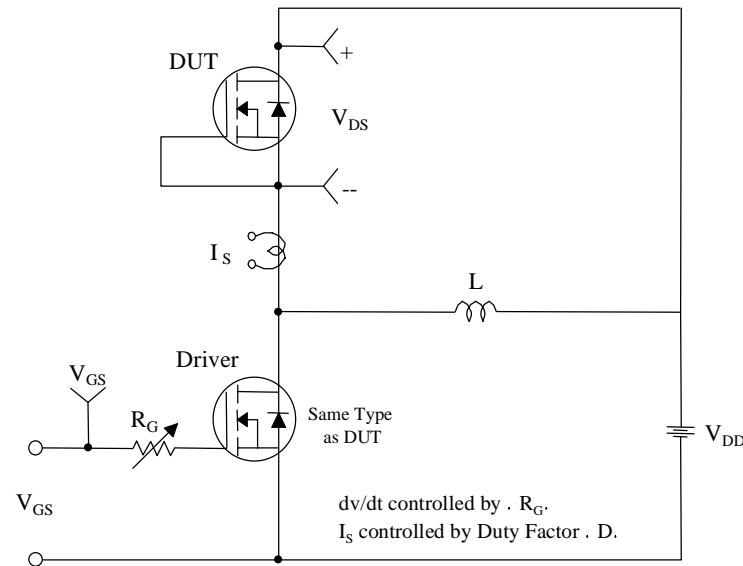


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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